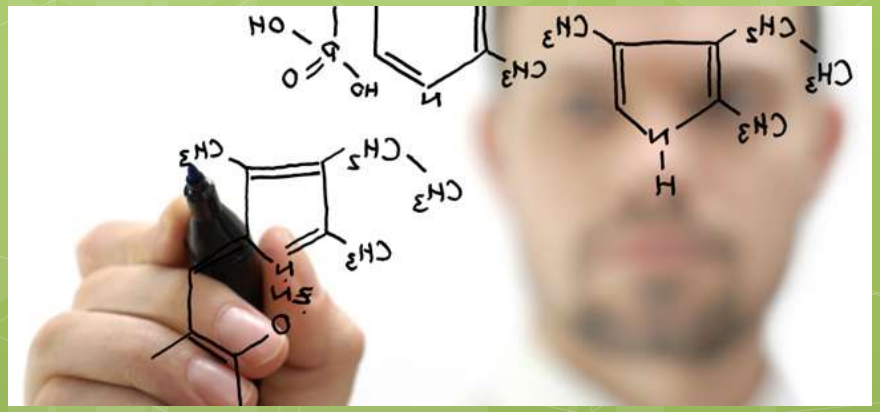
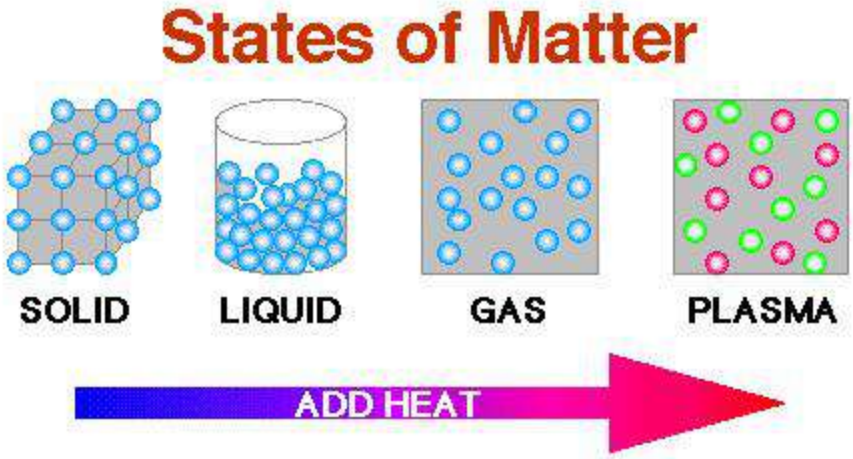


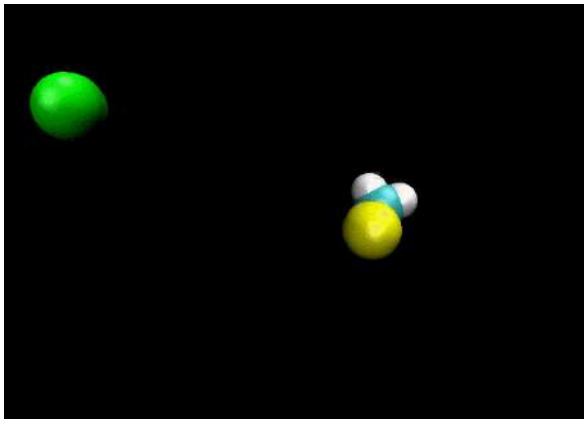
Chapter 1: Introduction to Chemistry

Jennie L. Borders

Section 1.1 - Chemistry

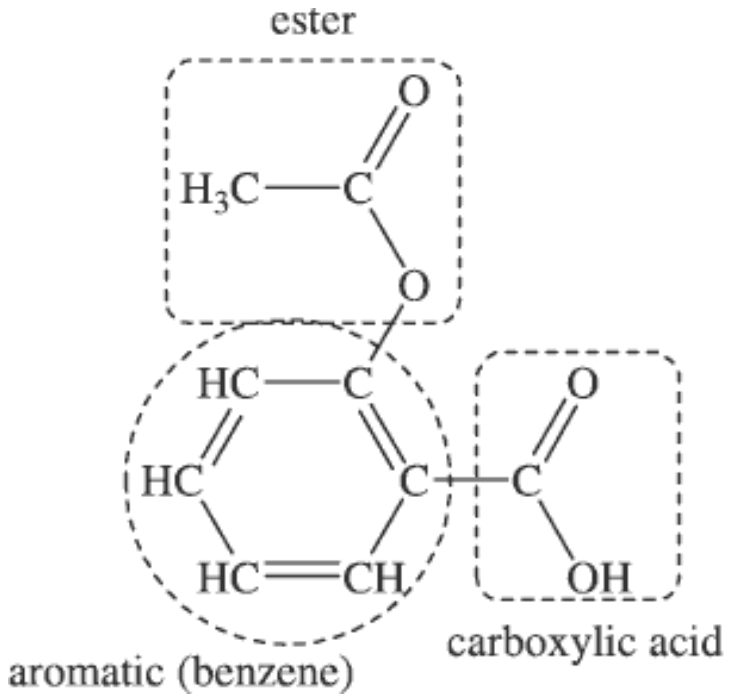
- Matter is anything that has mass and occupies space.
- Chemistry is the study of the composition of matter and the changes that matter undergoes.





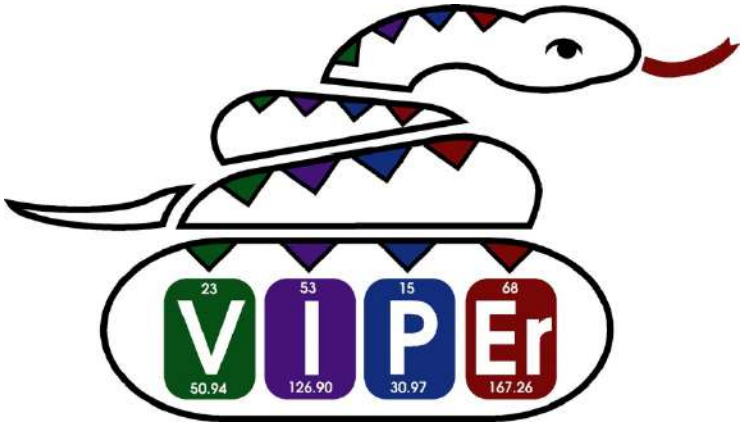
Branches of Chemistry

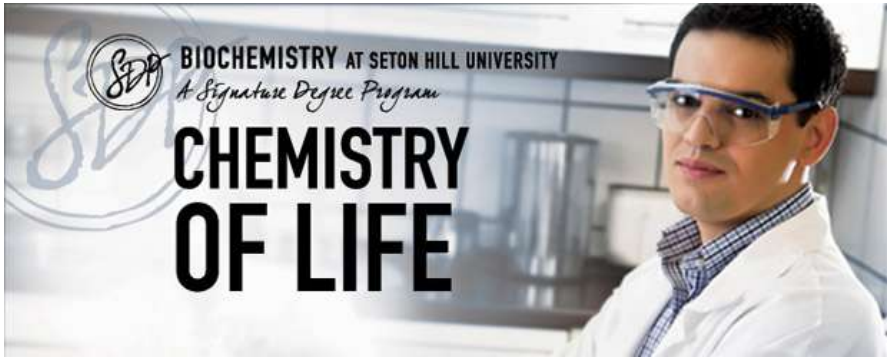
- Five traditional areas of study are organic chemistry, inorganic chemistry, biochemistry, analytical chemistry, and physical chemistry.
- Organic chemistry involves the study of all chemicals containing carbon.



Branches of Chemistry

- Inorganic chemistry involves the study of chemicals that do not contain carbon.
- Biochemistry is the study of processes that take place in a living thing.





Branches of Chemistry

- Analytical chemistry is the study that focuses on the composition of matter.
- Physical chemistry is the area that deals with the mechanism, the rate, and the energy transfer that occurs when matter undergoes a change.

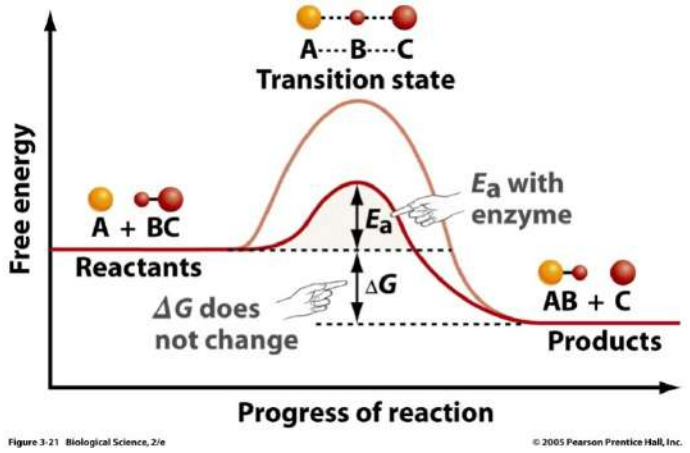


Figure 3-21 Biological Science, 2/e

Sample Problem

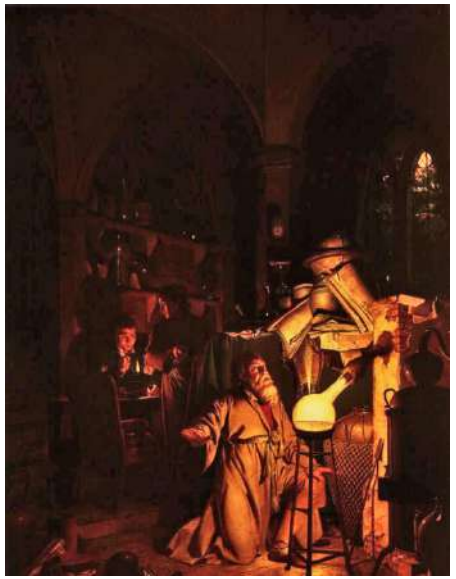
- Which branch of chemistry would the following belong to?
  - A police officer testing a white powder
  - The study of hydrochloric acid in the digestive system
  - Determining the speed with which a reaction takes place
  - The study of glucose ($C_6H_{12}O_6$)
  - The study of calcium deposits from hard water

Section 1.1 Assessment

- Name the five traditional areas into which chemistry can be divided.

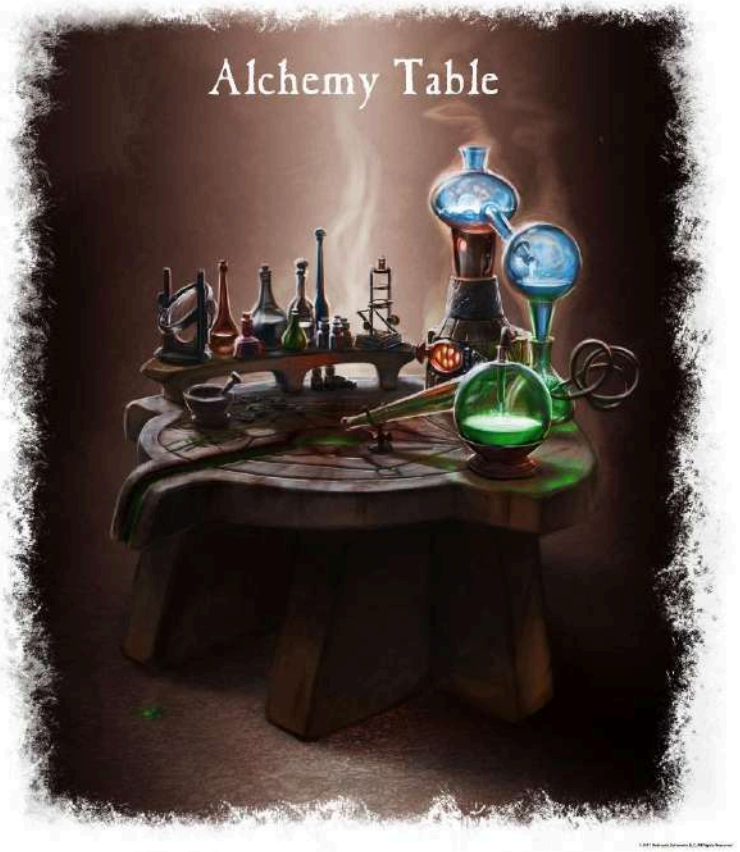
Section 1.3 – Thinking Like a Scientist

- Alchemists searched for a way to turn a cheap metal like lead into gold.
- One element cannot turn into another element by physical or chemical means, so their goal was impossible.
- They also created elixirs to extend life, but many died by drinking their own potions.



Alchemists

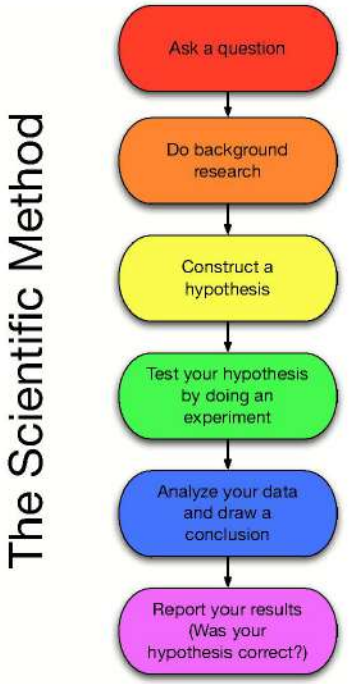
- Even though alchemists were unsuccessful in creating gold, they developed the tools and techniques for working with chemicals that we still use today.



Scientific Method

- The scientific method has 5 steps:

1. Ask a question
2. Observe/Research
3. Hypothesis – an educated guess based on observations
4. Experiment/Collect Data
5. Conclusion/Analyze Results

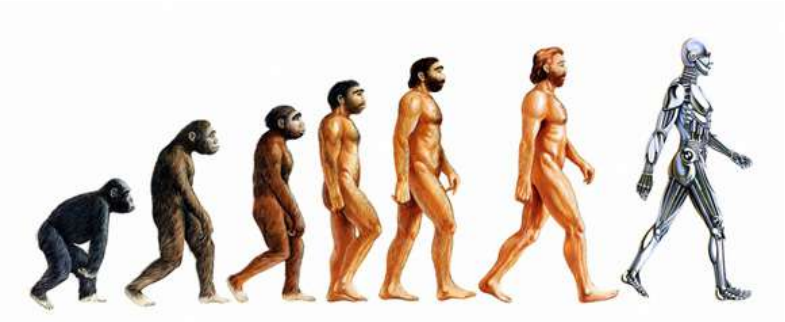


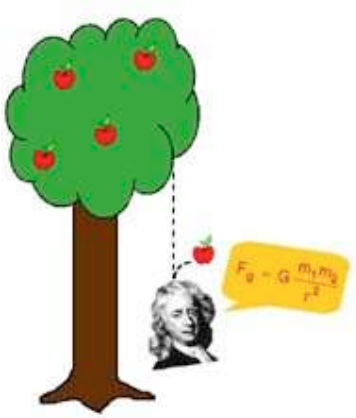
Variables

- The manipulated variable (independent variable) is the variable that you change during an experiment.
- The responding variable (dependent variable) is the variable that you observe during an experiment.
- A good experiment only has one manipulated variable.

Theory vs. Law

- A theory is a well-tested explanation for a broad set of observations.
- A scientific law is a concise statement that summarizes the results of many observations and experiments.
- A **theory** is an attempt to explain **why**. A **law** tells **what** happens.
- A theory can NEVER be proven to be absolutely correct.





Section 1.3 Assessment

- Name the 5 steps of the scientific method.
- What is the difference in a theory and a hypothesis?
- In Chapter 2, you will learn that matter is neither created nor destroyed in any chemical change. Is this statement a theory or a law? Explain.

Section 1.4 – Problem Solving in Chemistry

- The three steps to solving a numeric word problem are analyze, calculate, and evaluate.
- Analyze – identify the known and unknown
- Calculate – solve the problem

- Evaluate – is your answer reasonable?
- Always remember to put a unit!!

Section 1.4 Assessment

- List the three steps for solving numeric problems.
- There are 3600 seconds in an hour. How many seconds are there in one day?
  a. Identify the known and unknown.
  b. Calculate the answer to the problem.
  c. Evaluate your answer to see if it makes sense.